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Breast-feeding and fertility

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Breast-feeding and fertility

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In the name of God, the Compassionate, the Merciful

FOREWORD

by

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Breast-feeding is undoubtedly the best guarantee for the survival and development of an infant in the initial one or two years of its life. It is health promotion in its purest form. The unique qualities of breast-feeding are now beyond controversy.

However, these benefits have overshadowed another advantage of breast-feeding, namely its natural contraceptive effect. Exclusive breast-feeding and the resulting lactational amenorrhoea are now recognized as a family planning method which prevents conception in millions of women who have objections to the use of artificial contraceptives or who have no access to information or services which provide other family planning methods. However, this fact has not yet been properly disseminated, especially among underprivileged couples.

The interrelation between breast-feeding and fertility is now the subject of numerous laboratory, clinical, endocrinological and epidemiological studies in different parts of the world. Promotion and protection of breast-feeding is not only the highest priority for the survival and development of infants but is also a step towards ensuring maternal health through appropriate birth-spacing.

This publication, based on the proceedings of an intercountry consultation, describes briefly the salient findings of a multicentric research study in a number of countries in this Region to ascertain the interrelation between breast-feeding, lactational amenorrhoea and fertility. At the same time, it outlines steps to promote breast-feeding for fertility regulation through maternal and child health services. I am confident that it will help public health workers to disseminate the value of exclusive breast-feeding as an option for family planning.

Preface

The unique qualities of breast-feeding for the survival and development of infants has been recognized since time immemorial. Numerous clinical, epidemiological and animal studies have confirmed and, at the same time, have unraveled the mechanisms of these qualities. This special nutritive role has, however, overshadowed another advantage of breast-feeding, namely its natural contraceptive action. In fact, exclusive breast-feeding, as a natural family planning method, prevents more pregnancies worldwide than those prevented through artificial contraceptive measures. Creating more awareness of this role of breast-feeding and how best to utilize this role are matters of great importance and urgency.

That there is a contraceptive effect of breast-feeding has also been recognized in many cultures and in many countries for centuries. However, many senior health administrators and decision-makers are sceptical about the use of breast-feeding as a family planning method. Equally, many women themselves doubt its effectiveness.

It is only in recent years that interest has been renewed in breast-feeding as a birth spacing method. Numerous physiological, clinical, endocrinological, demographic and epidemiological studies have been and are being conducted to explore the extent to which and in what manner breast-feeding inhibits female fertility.

The Bellagio Consensus Statement of 1988 clearly states that lactational amenorrhoea could be regarded as an appropriate method of fertility regulation, and that a strategy should be incorporated into the family planning programme and presented as one of the elements of informed choice, particularly when other family planning methods are not readily available or desired.

In fact, promotion of breast-feeding can potentially become the nodal point for various maternal and child health (MCH) activities. Breast-feeding, through better infant nutrition and the increased birth spacing resulting from its antifertility effect, results in improved mother and child survival.

A multicentre study, based on a standard protocol, was conducted in Egypt, Pakistan, Saudi Arabia and Sudan to assess the effects of breast-feeding on lactational amenorrhoea and female fertility. The results have thrown considerable light on their interrelationship.

This technical publication is presented in three parts. The first part presents the available evidence on the role of breast-feeding in female fertility which has been reviewed and consolidated in a manner that is suitable for decision- and policy-makers as well as MCH workers. Breast-feeding for infant nutrition and for birth spacing, though two distinctly different roles, have interfaces that are highlighted in this part.

The second part discusses the methodology and the results of the multicentre study, while the third part presents an overall summary of the important teachings of the first two parts, in a form suitable for briefing medical personnel at all levels, national policy-makers, representatives of all organizations interested in promoting the health and welfare of women and children, and the media.

Acknowledgements

This publication is based on the deliberations of the WHO/UNFPA Intercountry Meeting on Breast-feeding and Fertility, held in Cairo in November 1990. The names of the participants are given in Annex 3 of the report of the meeting (document no. WHO-EM/MCH/196-E). They have all contributed to the preparation of this publication, for which the editors are grateful.

Dr Djamil Benbouzid and Ms Randa Saadeh were responsible for securing the necessary funds for the multicentre research study and briefing the principal investigators on the research methodology. They actively participated in the intercountry meeting in Cairo and provided technical advice on numerous issues. The editors express their grateful thanks to them.

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Finally, the editors express their grateful thanks to Mrs Mona Abdel Aziz, secretary in the Maternal and Child Health Unit in the Regional Office for the Eastern Mediterranean of WHO, for her help during the preparation of the manuscript, as well as the support of Miss Nancy Kamel, secretary in the Unit.

PART 1

BREAST-FEEDING, INFANT NUTRITION AND FERTILITY

1. Introduction

The unparalleled qualities of breast-feeding for the survival and development of newborn infants have been recognized in all countries from time immemorial. On the other hand, the role of breast-feeding in controlling female fertility during the postpartum period, though commonly mentioned in all cultures since antiquity, has not received adequate recognition, and is commonly regarded as a "grandmother's tale". Recent renewed interest in this particular role of breast-feeding has led to a large number of epidemiological and demographic studies that clearly indicate that breast-feeding in developing countries, especially among populations in the lower economic segments, plays a much greater role in preventing early postpartum conception than any artificial contraceptive. Globally, breast-feeding prevents more pregnancies than those prevented by all other forms of contraceptives put together. Its role is particularly important in populations that have no access to any type of family planning method or in those that do not desire to adopt artificial contraceptive methods.

The role of breast-feeding in the promotion of proper nutrition in infants and in fertility regulation in mothers are strongly interrelated. It is important to discuss in depth the particular role of breast-feeding in fertility regulation, and how that role can influence the promotion of infant nutrition on the one hand, and the use of contraceptives on the other.

1.1 Islam and breast-feeding

The unique role of breast-feeding for the survival and development of newborn infants has been mentioned in all religions and cultures and has been universal practice in all countries for millennia. The Koran provides clear rules governing breast-feeding and the adoption of a wet nurse if, for unavoidable reasons, the mother is unable to continue breast-feeding.

> **"Mothers shall suckle their offsprings for two complete years in order to complete the term."**
>
> **The Koran, Sura II, Al-Baqarah, verse 233**

The verse continues by stating that weaning is allowed before completion of the two-year term, provided that this decision is taken by mutual consent of the father and the mother. Furthermore, the parents may choose to have a foster mother (wet nurse).

1.2 Uniqueness of human milk

The uniqueness of human milk is universally recognized and its virtues are still respected in most developing countries. The steady decline of breast-feeding in the developed world is indeed a major human tragedy. In the developing world, this decline has been observed mostly among urban populations, with an especially disastrous impact on infant morbidity and mortality among socioeconomically deprived families.

While breast-feeding has been generally viewed in developed countries as an "aftermath" of human reproduction, "an optional extra tacked on at the end, like the credits of a motion picture" (Short, 1984), in the developing world it is a way of life for the survival of the human species. Two patterns of social behaviour have caused a decline in breast-feeding in recent years basically for two reasons:

— aggressive marketing strategies of multinational food industries;
— increasing numbers of women in urbanized societies joining the workforce.

The vigorous measures adopted by international agencies, notably WHO and UNICEF, since 1978, in collaboration with countries and with the support of several nongovernmental organizations, have been successful in halting this trend, most remarkably in the developed world. However, sustained action is still needed by the health sectors in all developing countries to co-establish breast-feeding as the proper and regular practice.

While discussing the relative merits of human milk and processed milk substitutes, Professor Paul Gyorgi, Nobel Laureate paediatrician, once remarked that "the brain of the most outstanding scientist in the world will never be able to produce a fluid, the virtues of which could be compared with the milk secreted by the mammary glands of women". This statement, made some 40 years ago, still holds good.

What is most important is that health workers make mothers aware of the steps through which the special values of breast-feeding can be fully utilized for the benefit of the baby. It should, however, be noted that there are numerous misconceptions as well as poor information about certain facets of infant feeding with mother's milk, for example, the duration of exclusive breast-feeding, timing of supplementation, type of food supplements and frequency of feeding.

The entire spectrum of breast-feeding behaviour varies widely from one country to another, and even from one culture to another within a country. It is important to collect reliable information about these behaviours before appropriate messages are developed for dissemination to mothers. What is generally available in the countries is information about the overall pattern of breast-feeding, durations of breast-feeding and the period at which food supplementation starts. However, equally important are data on the duration of exclusive and partial breast-feeding, time intervals between feeds, actual duration of individual feeding, pattern of night-time feeding, and details of the introduction of food supplements to replace breast-feeding.

The highlights of the research recently carried out under a WHO-sponsored multicentre study on breast-feeding and fertility in a few countries of the Eastern Mediterranean Region of WHO are of considerable importance in this respect, and some details are presented in Part 2 of this publication.

1.3 Importance and advantages of breast-feeding

The human baby, like the offspring of other mammals, is born to a ready-made source of food supply and, for both mother and child, breast-feeding is natural and supported by instinct. The milk of different mammals is uniquely species-specific and its composition is adapted to the needs of the offspring. The protein content of human milk, lowest of all the mammals, is in keeping with the slowest rate of growth of the human infant.

Breast milk is free from external contamination and unadulterated, is available at the desired temperature, is easily digestible and is "tailor-made" for the needs of the infant. It is uniquely suitable for night-time feeding of the infant, who should be, ideally, close by the mother throughout the night. The advantage of night feeding, which promotes natural contraceptive action, is discussed later.

By virtue of its anti-infective properties and freedom from contamination, breast-fed babies have a lower incidence of diarrhoea, respiratory infections, necrotizing enterocolitis and consequent mortality. There is a reduced risk of eczema and milk allergy, and evidence suggests that such babies are less likely to develop obesity, hypertension and atherosclerosis in later life. Late-onset tetany, metabolic acidosis, and acrodermatitis enteropathica are limited to artificially,

formula-fed babies. Breast-feeding ensures better postpartum involution of reproductive organs and affords some protection to the mother against breast cancer. And as opposed to the conventionally held view, breast-feeding promotes a better figure in the mother because fat reserves that were built up during pregnancy are dissipated during lactation. Furthermore, breast-feeding fosters a close physical and emotional contact of the child with the mother; it gives satisfaction to the mother and generates a feeling of importance, indispensability and motherliness.

The economic benefits of breast-feeding to a developing country are obvious when one calculates the amount of milk that lactating women in the country produce annually. In the absence of breast-feeding, the equivalent quantity of baby foods would have to be imported at tremendous cost—a cost that most developing countries cannot afford.

1.4 Biochemical and physiological characteristics of human milk

Mammalian milks are fluids of great complexity, uniquely suited to the needs of the young of the species concerned. The old adage, "human milk for human babies and cow's milk for the calves" is perfectly correct. The composition of human milk is unique: it differs from cow milk or the milk of any other species, as well as from industrially-processed breast-milk substitutes in both quantitative and qualitative terms.

Human milk has the lowest protein concentration among the milk of mammals—approximately 1.15 g/100 ml, for example, cow milk contains approximately 3.5 g/100 ml. Even in qualitative terms, human milk protein is different; for example, the whey:casein ratio of human milk is roughly 80:20, while that of cow milk is 20:80. This high ratio of whey to casein in human milk results in the formation of a softer gastric curd, which facilitates digestion.

The fat concentration in human milk of about 4 to 4.5 g/100 ml is low in comparison to that of bovine milk. The quality and fatty acid profile of human milk is precisely suited to the needs of the growing infant. The lactose concentration in human milk is the highest among all mammalian milks, 7%, being matched to the growing-needs of human babies.

The mineral concentrations in human milk are lower than those in other types of milk and are suitable for the baby's limited needs and metabolic capacities; however, the bioavailability of iron in human milk is far superior to that in other milks. Finally, many enzymes in human milk are multifunctional.

1.5 Immunobiology of breast milk

Human milk is not only best suited and specific for nutritional needs, but also boosts the host defences of the newborn. It is replete with immunoglobulins, cellular elements and non-specific humoral protective factors. Breast milk contains large quantities of IgA and IgM antibodies that are not otherwise available to the newborn baby because they do not cross the placenta.

Some IgG immunoglobulins are also present in breast milk. The highest concentration of secretory IgA in any body fluid is found in the colostrum. High titres of antibodies present in the colostrum drop sharply over the first few days after delivery. By virtue of its composition, colostrum is best suited for the nutritional and protective needs of the baby. It is unfortunate that discarding of colostrum is a common practice in many societies even today. Milk immunoglobulins are not absorbed in sufficient quantities and do not significantly contribute to serum immunoglobulins of the suckling infant. Secretory IgA binds microorganisms and prevents their

penetration into intestinal mucosa. IgA can also lyse certain enteric bacteria in the presence of the complement and lysozyme. In addition to specific antibodies, human milk also contains non-specific humoral factors such as lysozyme, lactoferrin and lactoperoxidase.

Human milk contains live cells to the extent of 1 to 2 million leucocytes/ml. Macrophages make up to 90% of white cells, while 10% are lymphocytes with equal distribution of B- and T-cells. Macrophages offer a primary line of defence against many pathogens. A majority of colostral B-cells differentiate into IgA-secreting plasma cells, similar to B-cells at mucosal sites and most of the antibodies elaborated by them are directed against enteric and respiratory pathogens. There is evidence to suggest that cell-mediated immune response, following BCG vaccination, is better in breast-fed babies than in infants on artificial feeding. Breast-fed babies have also been shown to have reduced risk of lymphoreticular malignancy in later life.

1.6 Breast-feeding and HIV status of the mother

Concern has been expressed recently regarding the risk of transmitting the human immunodeficiency virus (HIV) from an infected mother to her child through breast milk.

The World Health Organization and the United Nations Children's Fund held a consultation in April/May 1992 on HIV transmission and breast-feeding at which all the data available were reviewed. It was recommended that breast-feeding should be promoted and supported in all populations, irrespective of HIV infection rates. The benefits to the baby outweighed the unproven risk of becoming infected by virus excreted in breast milk.

However, the Centers for Disease Control of the USA and the Department of Health and Social Security in the UK have recommended that HIV-positive women should not breast feed. This advice may be more pertinent to the situation pertaining in those countries where hygiene conditions and availability of replacement feeds are assured.

2. Breast-feeding and birth spacing

2.1 Child survival and child spacing

Child survival is a powerful motivational factor leading to a desire for smaller families. It has enormous importance in both policy formulation and programme development. Data from the World Fertility Survey show that the risk of a child dying in the first years of life depends on the preceding birth interval. Mortality can be greatly reduced if the child is born at least two years after its elder sibling, especially in places where most mothers are uneducated and lack access to primary health care facilities and adequate environmental sanitation. The effect of birth interval on child survival is found to be even greater than the effect of multiparity or the mother's age at childbirth. Furthermore, the life-saving effects of increased spacing of the pregnancies remain strong, even when the influences of length of previous gestation, survival status of the previous child and maternal educational attainment are taken into account. It has been estimated that a preceding birth interval of less than two years can raise the average chance of a child dying before the age of five years by about 50%.

The underlying mechanisms responsible for this effect are obscure, although an ill-defined "maternal depletion syndrome" is often invoked, which is considered to result in the birth of a low-birth-weight baby with diminished chances of survival.

There is another deleterious effect of short birth interval on child survival. A new pregnancy cuts off the milk production, leading to the abrupt weaning of the older child. This can have disastrous consequences, especially in socioeconomically deprived populations. Kwashiorkor, a West African term, meaning literally "the disease of the displaced one", is used to describe the symptoms of gross protein malnutrition in the older child if it is suddenly deprived of its principal source of dietary protein through early weaning.

2.2 Postpartum contraception

There is clearly an urgent need for contraceptive measures to increase birth interval to benefit the mother and her offspring. What is important for developing countries is to identify postpartum contraceptives that do not inhibit lactation, but would optimize the birth interval. Interestingly, it has been calculated that the People's Republic of China could abandon the one-child-family policy without having to alter its population growth targets if the first birth was postponed until the age of 28 years, and there was at least a four-year birth interval. Well-spaced pregnancies would also reduce maternal mortality; according to one estimate, restricting the age of childbearing to between 20 and 39 years could reduce maternal mortality in developing countries by as much as 11%.

It may not be possible to predict with accuracy the exact number of maternal, infant and childhood deaths that could be saved by a judicious combination of breast-feeding and modern forms of contraception in order to achieve optimal birth spacing in excess of two years. Presently, an ideal contraceptive is not available for this critical stage in a woman's reproductive life. But the potential benefits of breast-feeding for the health of mother and child are so enormous that protection of breast-feeding should always be uppermost when formulating public health policies—for both developed and developing countries.

2.3 Breast-feeding for birth spacing

The role of breast-feeding for infant survival and development has overshadowed the unique advantage of breast-feeding in being a natural contraceptive. The contraceptive effect of breast-feeding has been recognized in many cultures and in many countries for centuries. Aristotle pointed out that, while women are suckling children, menstruation does not occur according to nature, nor do the women conceive; if they do conceive, the milk dries up (Barnes, 1984). The world-wide trend towards bottle-feeding, and the availability of artificial contraceptives have obscured the value of breast-feeding for purposes of birth spacing.

Many women have little or no access to contraceptive technology and consequently the use of artificial methods for fertility regulation is low. Thus, in cultures where frequent and prolonged breast-feeding is common, the resultant postpartum amenorrhoea and suppressed ovulation are frequently the principal mechanisms that ensure adequately spaced pregnancies. Indeed, in most developing countries, more births are still averted this way than by any other single family planning method.

Although lactational amenorrhoea is not completely reliable as a protection against pregnancy for the individual mother, the effectiveness of breast-feeding as a birth spacing mechanism has important global health policy implications.

A better understanding of the reasons for the widely varying differences between communities and individuals, and of the factors that control lactational infertility should facilitate the

development of guidelines for use by health planners and health care administrators to maximize the contraceptive effect of breast-feeding. Practical guidance as to when mothers should adopt other contraceptive methods and how to prevent the adverse effects of some hormonal contraceptives on lactation is particularly important. To contribute to an improved understanding of the effectiveness of lactation as a contraceptive method and its relationship to child spacing, WHO's breast-feeding databank collects and analyses information on breast-feeding and its effect on fertility regulation.

2.4 Birth interval and fertility

A number of studies have indicated that breast-feeding lengthens the interval between pregnancies and thus decreases natural fertility. Longer intervals between births, in turn, significantly enhance infant survival and reduce maternal morbidity and mortality, especially in developing countries.

In populations where the prevalence of artificial contraceptive use is low, birth intervals are largely determined by the frequency and duration of breast-feeding. Where breast-feeds are frequent throughout day and night and prolonged feeding is the usual practice, the length of birth intervals is increased by an estimated 15% to 32%. Studies in rural Punjab in India, and in Taiwan have demonstrated that birth or pregnancy intervals for women who breast-feed on average for one to two years, and who used no other form of contraception, were five to ten months longer than those who miscarried or whose infants died after birth. Other studies have demonstrated that conception rates in women who did not use artificial contraceptives, but who continued to breast-feed, remained low for nearly one year after delivery.

However, breast-feeding is not always solely responsible for prolonged interbirth intervals. For example, mandatory sexual abstinence during or even beyond the normal period of lactation in some traditional societies (among the Yoruba in Nigeria, for example), can also play an important role. Although this practice is gradually eroding, it remains important enough to warrant careful consideration in any study of the relationship between breast-feeding practices and fertility.

3. Breast-feeding and lactational amenorrhoea

Most of the controlled studies on this subject clearly indicate that the longer the duration of breast-feeding, the longer is the amenorrhoea period. Where breast-feeding has lasted for a very short period, one to two months only, menstruation is likely to resume only after suspension of nursing. However, if the nursing period becomes longer, menstruation is much more likely to resume before cessation of breast-feeding.

Considerable data exist to suggest that the duration of lactation is a critical determinant of the duration of lactational (postpartum) amenorrhoea. Prolactin is the major factor in the initiation of lactation and in the relative infertility during lactation, while not only the fact of breast-feeding but also the number of suckling episodes is regarded as a determinant of plasma prolactin levels.

Data from the WHO Collaborative Study on Breast-feeding (1981) indicate that breast-feeding at night is a rarity even between birth and two months of age in developed countries, while infants are fed two to three times at night in most developing countries. Prolactin levels in plasma have been shown to be higher in mothers whose infants suckle frequently on demand during the day, as

well as during the night, than in women whose infants suckle during the day only. It is highly probable that the suckling episodes and the consequently elevated prolactin levels, both during the day and the night, might be an important factor for the observed differences in the duration of lactational amenorrhoea in developed and developing countries.

Another related fact of considerable interest is the effect on lactational amenorrhoea of food supplements given to the infant during the breast-feeding period. Early introduction of food supplements leads to early resumption of menstruation.

However, undue delay in the introduction of supplements cannot lead to an indefinite postponement in the return of menstruation and fertility. Usually, the introduction of supplements results in a reduction in both the number of suckling episodes and in the total duration of suckling. Longitudinal studies indicate that, with feed supplementation, there is a rapid decline in the prolactin level, inevitably resulting in the rapid return of menstruation and associated fertility.

3.1 Duration of lactational amenorrhoea

Lactational amenorrhoea has the greatest impact on birth interval and is commonly used as an indicator of lactational infertility. Based on a number of studies that have attempted to establish a relationship between lactation and postpartum amenorrhoea (**Table 1**), the median duration of amenorrhoea following childbirth appears to be about 7 to 10 weeks in the absence of lactation. In contrast, the duration of amenorrhoea among lactating women can extend to two years. The extent to which fertility is reduced during the months prior to, and immediately following, the resumption of menstruation can thus be determined and analysed by collecting data on the proportion of mothers who are menstruating and the respective postpartum intervals.

The WHO Collaborative Study on Breast-feeding, and other related studies indicate that the return of menstruation and fertility occur much more rapidly in women in industrialized countries than in women from the lower economic segments of populations in developing countries. This may be attributable to differences in breast-feeding practices, full or exclusive breast-feeding being common in developing countries and more closely associated with longer periods of lactational amenorrhoea and infertility, while partial breast feeding is the usual pattern in industrialized countries.

It is important to make a distinction between exclusive and partial breast-feeding. A woman who is partially breast-feeding can become pregnant, whereas few become pregnant when fully breast-feeding. The Bellagio Consensus, to be described later, clearly states that the maximum birth spacing effect of breast-feeding is achieved when a mother "fully" or "nearly fully" breast-feeds and remains amenorrhoeic. When these two conditions are fulfilled, breast-feeding provides more than 98% protection from pregnancy in the first six months postpartum. **Table 2** gives a simple guide to assist women in determining the conditions under which breast-feeding acts as a birth spacing method.

If the answer is "No" to any one of the questions, then her chances of becoming pregnant increase and therefore she cannot rely on breast-feeding alone as a child spacing method. She should consider using another family planning method, but should be encouraged to continue to breast-feed for her child's health. If the woman can answer "Yes" to all three questions, then she has only a 2% chance of getting pregnant.

Several studies have documented an association between dietary supplementation for the infant and shortened periods of postpartum amenorrhoea; this is presumed to be the result of less vigorous and frequent suckling as a result of introduction of other foods.

TABLE 1. Median duration of breast-feeding and postpartum amenorrhoea

Country	Year(s) of study	Sample size	*Median duration (months)* Breast-feeding	Postpartum amenorrhoea
Bangladesh	1981-84	3836	27.0	15.0
Benin	1981-84	2803	19.0	12.0
Botswana	1984	3064	19.5	7.3
Cameroon	1981-84	4650	18.0	12.0
Colombia	1988	702	8.0	3.0
Egypt	1981-84	5667	16.0	9.0
Fiji	1981-84	2660	9.0	5.0
Ghana	1981-84	3335	18.0	12.0
Haiti	1981-84	1489	15.0	12.0
India	1982	428	20.0	11.0
Indonesia	1982	1254	24.0	10.0
Ivory Coast	1981-84	3804	18.0	10.0
Jordan	1978	769	13.0	3.0
Kenya	1981-84	5679	17.0	10.0
Lesotho	1981-84	2348	19.0	10.0
Mauritania	1981-84	2447	16.0	9.0
Mexico	1985-86	1131	5.0	3.0
Nepal	1976	5954	25.0	18.0
Pakistan	1986	1098	17.0	12.0
Philippines	1981-84	6667	13.0	8.0
Republic of Korea	1973	746	25.2	13.6
Sri Lanka	1986-87	1350	23.0	8.0
Sudan	1981-84	2242	16.0	11.0
Syrian Arab Republic	1981-84	4025	11.0	7.0
Taiwan	1972	1516	18.0	11.0
Thailand	1984		18.0	6.0
Tunisia	1981-84	3021	14.0	7.0
Turkey	1975	515	13.0	7.0
Zaire	1987-88	1102	9.0	4.0

Source: Breast-feeding and Child Spacing: From Information Collection to Public Policy, by Saadeh, R., and Benbouzid, D., World Health Organization, Geneva, 1989.

TABLE 2. **Guide for determining conditions for breast-feeding to act as birth-spacing method**

Is the baby less than six months old?	Yes	No
Is the mother amenorrhoeic? (no vaginal bleeding 56 days postpartum)	Yes	No
Is the baby "fully" breast-fed?(fed frequently, night and day, with little or no supplementation)	Yes	No

Data from Table 1 must be analysed in this light. Thus the fact that in Jordan, for example, the median duration of postpartum amenorrhoea is only three months, whereas the median duration of breast-feeding is 13 months, suggests that the vast majority of these women must have introduced supplements at a very early age. Without information on the extent of breast-feeding (full or partial), such data are of limited value. The Bellagio Consensus Statement shows essentially no difference in the contraceptive effect of breast-feeding between industrialized and developing countries when the extent of breast-feeding is taken into account.

Breast-feeding patterns, such as scheduled versus demand feeding and prevalence, duration of night feeds, and practices related to type of supplementary foods and timing of their introduction, all have an impact on the duration of postpartum amenorrhoea. There is suggestive evidence that, when frequent breast-feeding is maintained, the introduction of supplementary foods has little effect on the resumption of menstruation and return of fertility. However, additional research in this area is needed.

For breast-feeding to serve optimally as a means of prolonging intervals between pregnancies, full, on-demand breast-feeding is recommended for 4-6 months. The introduction of supplementary foods should be delayed as long as possible, but without, of course, jeopardizing a child's health or its growth.

Return of menstruation is frequently used as a convenient indirect indicator of resumed ovulation and fertility, especially in studies of large populations. There is a direct relationship between lactational amenorrhoea and the duration of lactational infertility. Fertility is substantially reduced during the period of lactational amenorrhoea; only between 2% and 10% of breast-feeding mothers conceive before resuming menstruation postpartum. The risk of conception for amenorrhoeic lactating women is related to the time lapsed since delivery. Breast-feeding women who resume menstruation within six months of childbirth usually do so before their first postpartum ovulation, whereas those who remain amenorrhoeic for more than six months are most likely to ovulate before first menstruation. Thus, the return of menstruation can be used only during the early postpartum period as an indicator of when to begin using other methods of contraception. Information on variations in the duration of amenorrhoea in rural and urban areas of selected developed and developing countries showing the proportions of women who began breast-feeding and its duration, and when they resumed their menstruation at specified intervals after birth, can be useful in identifying those who are at risk of becoming pregnant.

3.2 Other factors influencing lactational amenorrhoea and breast-feeding behaviour

Age and parity have long been regarded as important factors influencing lactational infertility and breast-feeding behaviour since the period of lactational amenorrhoea tends to be longer in older and multiparous women than in younger and primipara. The two factors are almost always strongly correlated.

Other possible factors affecting lactational infertility, for example maternal nutritional status, are independent of the frequency and duration of breast-feeding. Studies have shown that, except in extreme cases of deprivation and famine, malnutrition has only a minor impact on the quality and quantity of breast milk.

There is some evidence to indicate that the return of menstruation during lactation may be delayed in undernourished women. Results from India suggest that, amongst women of the same socioeconomic status who have similar breast-feeding patterns, lactational amenorrhoea was longer for women with low body weight for any given duration of lactation.

As mentioned earlier, the type and timing of supplementary feeding also have an important impact on the suckling behaviour. Heightened fertility status is generally associated with a reduction in the number, intensity and duration of suckling episodes, resulting in a relaxation of the neural inhibition of the hypothalamus, a decline in prolactin levels and, inevitably, an earlier resumption of ovulation and menstruation. It is suggested that, if additional foods are introduced into the baby's diet gradually and over an extended period of time and breast-feeding is continued, there will still be a significant antifertility effect for a year or more. Obviously, the key requirement is the continuation of breast-feeding and, where supplementary foods are introduced in the baby's diet, these foods should not replace breast-feeding. In practical terms, these foods should be given only after the baby has received the usual breast-feed. In other words, the essential criterion is that other foods should not replace breast-feeding.

4. Lactation and ovulation

Another method for assessing the duration of lactational infertility is based on the detection of the time of ovulation. Despite problems of interpretation, various studies attempting to define the timing of ovulation after childbirth have used endometrial biopsy, basal body temperature, cervical mucus or vaginal cytology as indirect markers of ovulation. Other studies have used more direct indices, such as blood, salivary or urinary hormone estimations or ultrasound of the ovaries, in combination with endocrine measurements.

The classical study of Perez *et al.* in Chile (1972) of 200 women prospectively for an average of four months after delivery, using basal body temperature and endometrial biopsy techniques, has clearly demonstrated the strong impact of the duration of lactation on the onset of ovulation. The longer the period of lactation, the longer was the anovulatory period. The Perez study provided evidence that ovulation occurred before menstruation in a fairly significant percentage of cases, and this might explain a finding that 2% to 12% of women conceived before resumption of menstruation. The return of menstruation in the postpartum period is a less valid indicator of the return of fertility.

The frequency of ovulation in the cycle before the end of lactational amenorrhoea varied between 14% and 75%, which may be partly due to different suckling patterns. As mentioned earlier, the longer the first menses are delayed during lactation, the more likely that the first cycle will be ovulatory. Nevertheless, the duration of lactation does have a strong impact on the onset of ovulation; the longer the period of lactation, the longer the anovulatory period.

Generally speaking, at six months postpartum, there is increased likelihood of ovulation preceding the first vaginal bleeding. It is at this point that lactational infertility fails to provide protection against another pregnancy. Obviously, this is the appropriate time for using other contraceptive measures if pregnancy is to be avoided.

5. Breast-feeding and fertility regulation

5.1 Evidence of fertility regulation

It would be interesting to examine the existing evidence concerning the role of breast-feeding in fertility regulation. It is difficult to pinpoint the genesis of this age-old effect in human evolution. A number of well-documented studies in different parts of the world are available to show that, in the most primitive societies, with absolutely no access to any type of outside influence, breast-feeding is continued for 3 to 4 years, with a birth interval of 4 years or more. The best documented study, among the Kung tribe of the Kalahari Desert in the southern part of Africa, is indeed revealing (Short, 1984). This hunter-gatherer society, one of the few existing in the world today, is not aware of any modern form of contraception and has no fertility-regulating practices, such as late marriage or taboo on sexual intercourse during lactation. They have an average completed family size of 4.7 children and a mean birth interval of 4.1 years. That these long birth intervals are achieved by breast-feeding is evident from the fact that if lactation ceases due to the death of the infant, the mother is soon pregnant again. The mother carries the infant wherever she goes and it sleeps by her side at night. The infant suckles frequently during the day (about four times per hour), although each feeding lasts for a minute or two only. The infant also suckles frequently at night, even when the mother is sleeping.

It is also known that close relatives of human species, the chimpanzee and the gorilla, also suckle their young several times an hour in the wild, secrete a milk quite similar to human milk, sleep with the infant at the breast at night and have a birth interval of four to five years.

5.2 Fertility regulation mechanism during lactation

Lactational infertility takes two forms. There is a period of complete infertility during lactational amenorrhoea when ovulation is suppressed, and this is followed by a variable period of lowered fecundity after the resumption of ovulatory menstrual cycles. Breast-feeding women who resume menstruation within six months of childbirth will usually do so before the first postpartum ovulation. The first menstruation in such cases is the result of oestrogen withdrawal bleeding as waves of follicular development and atresia occur in the ovaries. Those who remain amenorrhoeic for more than six months are more likely to ovulate before they menstruate first.

All evidence points to the fact that the initiator of the intricate endocrinal system which controls fertility is the suckling stimulus from the nipple, rather than the production of milk. In other words, frequent suckling of the nipples during day and night will initiate and maintain the hormonal secretion that not only maintains milk production and its ejection, but also inhibits ovulation—leading to lactational amenorrhoea and depression of fertility. The mechanism by which suckling inhibits fertility is not fully understood, but certain hormonal changes have been observed:

(a) Suckling causes a reflex discharge of the hormone prolactin from the anterior pituitary gland, recognized as essential for the maintenance of milk secretion. This stimulus also inhibits the secretion of dopamine by the hypothalamus, thereby increasing the secretion of prolactin. Dopamine has an inhibitory action on the secretion of prolactin.

(b) Suckling causes a reflex discharge of the hormone oxytocin from the posterior pituitary gland and this causes the ejection of milk from the alveoli of the mammary gland.

(c) High output of prolactin inhibits the secretion of the luteinizing hormone and may also have a direct inhibitory effect on the ovaries, thereby suppressing ovulation.

(d) Stimulation of hypothalamus, induced by suckling, seems to cause a local release of beta-endorphin which, in turn, suppresses the discharge of hypothalamic gonadotropin-releasing hormone and leads to failure of ovulation.

A large number of studies in different countries have clearly identified the results of the above-mentioned hormonal changes in lactating women, with special reference to lactational amenorrhoea. The following were the important conclusions of these studies:

(a) Women who bottle-fed their children began to menstruate at an average of 8 weeks after delivery and ovulate after 11 weeks, while the women who breast-fed began to menstruate and ovulate, on an average, 33 weeks and 36 weeks respectively, after delivery.
(b) No woman ovulated if she was breast-feeding six or more times a day and for more than 60 minutes a day.
(c) Late-ovulating women breast-fed longer, suckled often, kept up night-feeding longer and introduced supplementary foods for the baby more gradually.
(d) With the introduction of food supplements, there was a sharp decline in the frequency of suckling and the level of prolactin in the blood.
(e) In the majority of breast feeding women, the ovaries are inactive for most of the periods of lactational amenorrhoea.
(f) With increasing time elapsing after birth, and as supplements were gradually introduced into the baby's diet, the frequency and the duration of suckling started to decline and cyclical ovarian activity resumed. (Most breast-feeding women will start eventually to menstruate and ovulate while they are still lactating. This explains the popularly held belief that breast-feeding is an unreliable form of contraception.)
(g) The interval of time between feeds may be particularly important for the inhibition of postpartum ovulation. Hence the abandonment of night-time feeding, so commonly practised, may disrupt the suckling effect on the hypothalamus. In communities, where night-feeding continues throughout lactation because the baby sleeps with the mother, lactational amenorrhoea continues for a longer period, with delayed ovulation.

6. Bellagio Consensus

6.1 Bellagio Meeting

In August 1988, an international group of scientists met to review the evidence on the use of breast-feeding as a viable family planning method. The meeting was held in Bellagio, Italy, with the support of the Rockefeller Foundation, Family Health International, and the WHO Special Programme on Research, Development and Research Training in Human Reproduction. The group represented worldwide experience in the disciplines of anthropology, demography, reproductive biology, obstetrics and gynaecology, sociology, infant and maternal nutrition, maternal and child health, family planning and health policy.

After reviewing 11 prospective studies, the group reached a consensus that the maximum birth-spacing effect of breast-feeding is achieved when a mother fully, or nearly fully, breast-feeds and remains amenorrhoeic, ignoring bleeding before the 56th postpartum day. Full or nearly full breast-feeding requires that breast-feeding constitutes the overwhelming majority of the feeding, and additional feeds are not replacements for breast-feeding.

When these conditions are fulfilled, it is considered that breast-feeding provides more than 98% protection from pregnancy in the first six months postpartum. If menstruation returns, or if breast-feeding ceases to be full or nearly full, or if six months have elapsed postpartum, the risk of pregnancy increases. As soon as one of these events occurs, consideration must be given to using other means of family planning if a high degree of protection is desired.

Breast-feeding can be used either as a method of birth spacing in its own right (when there are no alternative methods available or when the couple chooses not to use other family planning methods) or as a means to delay the introduction of other family planning methods.

Demographic data indicate that, in many developing countries, the protection from pregnancy provided by breast-feeding alone is greater than that provided by all other reversible means of family planning combined, and that breast-feeding makes a considerable contribution to securing a two-year birth interval.

How long lactational infertility remained effective was shown to depend on several factors, such as the postpartum period, the pattern of breast-feeding and the time and the nature of food supplementation. When breast-feeding ceased to be full or nearly full, it was found likely that fertility would precede the first vaginal bleeding. In some cases, lactational amenorrhoea continued after supplementary foods were introduced to the infant. Thus the key to lactational infertility is that breast-feeding should not be reduced and that other foods do not replace breast-feeding.

In order to use breast-feeding successfully as a child-spacing method, breast-feeding should be established *immediately* after birth and continued as long as possible. Exclusive breast-feeding must be practised. Women who wish to rely on the birth-spacing effect of breast-feeding should delay, as long as possible, the introduction of other foods to the infant's diet, but without jeopardizing the infant's growth and development. When additional foods need to be introduced (usually between the fourth and sixth month), women should be encouraged to continue breast-feeding frequently, day and night, in order to maintain their milk supply and the birth-spacing effect of breast-feeding.

In order to obtain the full birth spacing advantage of breast-feeding, the essential requirement of "full" breast-feeding for six months raises an important question about infant nutrition. Can an infant get its full nutrient requirement when only receiving mother's milk for the first sixth months of its life? The answer "No" is the usual message for the promotion of infant nutrition supplements. All evidence points to the fact that an infant's nutrient requirement is more than what the mother can give through her milk from about 4-6 months onwards, and this is precisely the period recommended for a gradual transition to the family diet.

The Bellagio Consensus answered the question in the following manner:

> **"If additional foods are introduced into the baby's diet gradually over an extended period, continued breast-feeding on demand, especially at night, can still exert a substantial antifertility effect for a year or more. The key requirement is that breast-feeding is not reduced and other foods do not replace breast-feeding. As a general rule, lactational infertility remains fully operative for the first six months postpartum, thereafter it decreases with time."**

7. Policy implications for infant feeding and birth spacing

7.1 Rationale for birth spacing for promotion of the health of mothers and children

From a global perspective, there are three major and fundamental rationales, namely demographic, health and human rights, for establishing organized birth-spacing programmes.

Each rationale has strong advocates. However, all three have strong implications for the health of women and their children.

The major objective of birth spacing is to prevent "high-risk" pregnancies, which account for a major share of maternal mortality. In simple terms, high-risk pregnancies can be paraphrased as:

— too early;
— too late;
— too close;
— too many.

While family planning programmes have been introduced in most developing countries as an integral part of maternal and child health programmes, it is being increasingly realized that a very large segment of the population in the developing world is not yet covered by them. What is urgently needed is to disseminate to these populations the awareness of birth-spacing methods which they can afford and which are not at odds with their religion and culture. Breast-feeding, as a national family planning method, exerts a "contraceptive" effect, while its role is unique in that it is vital for the survival of the infant as well.

7.2 Breast-feeding as a fertility control measure

Breast-feeding has the potential of regulating female fertility in the postpartum period, making it an effective birth spacer—a role that is unique and of particular importance for populations that are socioeconomically deprived and have no knowledge of, and access to, other contraceptive methods. Furthermore, throughout the world, millions of couples in many cultures prefer to adopt natural family planning methods for birth spacing. The results of recent studies have provided information that can guide maternal and child health (MCH) workers to achieve maximum benefit from breast-feeding and birth spacing for both the infant and the mother.

As already stated, lactational amenorrhoea cannot be fully relied upon to protect the mother against pregnancies. There are a number of variables that influence the fertility regulation role of breast-feeding, that must be clearly identified for each particular cultural and demographic setting in order to provide adequate guidelines for MCH workers. Similarly, careful consideration will be necessary to ensure that the nutrition-promoting role of breast-feeding is not compromised in any way to obtain the birth-spacing effect, such as postponing the weaning process.

Fertility regulation through breast-feeding is all the more important when viewed in the global context. About 90% of all infants born today are breast-fed for some period of time. In the early months of life, the introduction of other foods is common, particularly in industrialized countries, where weaning is often completed in the first 3-6 months of life. In developing countries, a much

higher percentage of infants are fully breast-fed for longer periods; prolonged breast-feeding for a full two years is not unusual.

Promotion and protection of breast-feeding is therefore highly important where it is already being practised widely, as well as increasing its prevalence when the practice is declining. This has been, and is being done, in most developing countries with considerable success. However, there are some basic questions that are frequently raised and for which answers have to be clearly spelt out and widely disseminated. Policy decisions can be based on these answers, and appropriate messages can be formulated for the mass media, as well as for person-to-person education.

7.2.1 EXCLUSIVE BREAST-FEEDING—HOW LONG?

Clinical, epidemiological, biochemical and metabolic studies have provided conclusive evidence that an infant's nutritional requirement can be fully met by the mother's milk up to 4-6 months after birth.

Introduction of any supplements within this period is not only unnecessary, but is also risky since supplementary foods prepared in an unhygienic environment introduce gastrointestinal infection. The best way to check whether mother's milk is meeting the nutritional needs of the infant is to observe the growth curve on a growth chart by regular weighing of the infant.

As a general rule, all mothers should be advised to start breast-feeding immediately after birth and continue exclusive feeding until the baby is four to six months old. During this period, there is normally no need for any type of food supplements. The feeding should be on demand and both the breasts should be emptied equally with adequate suckling time. This would mean at least 6 to 8 feeds in 24 hours, of which possibly one or two feeds would be during the night. To facilitate night feeding, the infant should be sleeping near the mother, preferably on the same bed.

7.2.2 WHEN TO INTRODUCE FOOD SUPPLEMENTS?

As the infant grows, its nutritional needs also increase rapidly, especially the need for energy and the protein for rapid growth. The nutritional need of the baby beyond the age of about 4 to 6 months is so much that breast milk alone is not sufficient. Mothers should recognize that, even if the infants do not show any sign of hunger, their nutritional needs will not be met adequately. Even if mothers are convinced that they are producing enough milk for their baby, the growth chart will clearly show that the growth starts faltering, usually from the age of six months onwards, even though the baby is apparently "well-fed" on the breast. Unfortunately, the monitoring of the growth of "healthy babies" through the growth chart is a relatively rare event, even in well-to-do families with literate mothers.

The weaning transition process

The transition, commonly known as weaning, from mother's milk to the "family diet" (i.e. outside foods) should be a very gradual process. This transition brings the risk that infants get diarrhoea resulting from infections introduced through outside foods. Thus, food and personal hygiene are of utmost importance in this period of the infant's life.

For reasons of disease resistance among others, it is therefore advisable to get the full benefits of mother's milk as long as possible, even up to two years if possible. To promote continued breast-feeding, supplementary food should be offered to the infant only after previous full suckling. In other words, outside foods should not replace breast-feeding. With the passage of time, as the secretion of breast milk gradually reduces, an increasing amount of outside foods of necessity have to be provided.

Continued breast-feeding and gradual weaning with appropriate foods will have three further positive effects:

(a) The infant will continue to get mother's milk as long as the mother can secrete. The milk, containing protein of high biological value, will complement the protein of staple foods, such as cereals, pulses and tubers, even when the quantity of milk is much reduced.
(b) The transition foods could be mostly cereals, beans and tubers with high energy density, which the infant will need in increasing amounts. These are, in fact, the usual food supplements of deprived populations.
(c) Continuation of full and frequent suckling for at least six months will induce longer periods of lactational amenorrhoea.

7.2.3 WHEN TO USE CONTRACEPTIVES FOR PREVENTING NEXT PREGNANCY?

A matter of considerable importance is the type of advice to be given to mothers regarding postpartum contraceptive use. In many countries, MCH workers contact women and encourage them to begin using contraceptives very early in the postpartum period. A recent study in Mexico indicated that most of the contraceptive users began to use them by the end of the second month postpartum. Usually, amenorrhoeic status is not considered when contraceptives are offered.

If the recommended breast-feeding behaviours are adhered to, the use of contraceptives could be delayed from immediate postpartum to 5-6 months postpartum; protection is first provided by the lactational amenorrhoea and, second, through the use of contraceptives as the amenorrhoea begins to decline.

In some countries and in some cultures, especially in African countries, sexual abstinence in the postpartum period significantly delays the next pregnancy. Lactational amenorrhoea and sexual abstinence in such settings are definite reasons for delaying the use of contraceptives postpartum. In situations where sexual abstinence is not observed and breast-feeding is either of short duration or associated with artificial feeding and early introduction of food supplements, the use of contraceptives is certainly indicated very early in the postpartum period. Any delay in the use of contraceptives exposes such women to the risk of another pregnancy. On the other hand, advice for birth spacing should be such that unnecessary "double coverage", i.e. lactational amenorrhoea and contraceptive measures, are avoided.

Demographers have observed that only 2% to 12% of women who exclusively breast-feed become pregnant prior to the return of menstruation. The timing as to when to use an alternative child-spacing method will vary for each woman. Table 2 was given as a basis for a guide to determine if breast-feeding continues to be reliable on an individual basis. In order to develop community-wide guidelines, one must have a good knowledge of breast-feeding patterns in, and fertility rates for, the community. This information will then be used to determine when the majority of women should begin using another family planning method.

A decline in breast-feeding incidence and duration would increase fertility rates significantly in some countries, such as Bangladesh, where breast-feeding is a major factor in maintaining existing fertility rates. Analysis of data from several countries reveals that a 25% decline in a high prevalence of breast-feeding would result in 2%-16% increase in fertility. The increase in contraceptive prevalence needed to offset this could be as great as 70 times the current contraceptive use. High fertility carries health and economic implications, while increasing contraceptive use to this degree can be expensive and practically impossible.

TABLE 3. **Recommended breast-feeding behaviours for optimal child survival and birth spacing**

- Begin breast-feeding immediately after birth.
- Never discard colostrum—this is vital for the baby and also for successful lactation.
- Follow " demand feeding" as often as possible—both during day and night.
- Keep the baby by your side at night to facilitate night feeding.
- Continue breast-feeding, even if the mother or the infant is sick.
- Avoid using a bottle, pacifiers (dummies) or other nipples.
- Follow this practise for at least 4-6 months after birth of the baby; practice regular weighing of infants (growth chart).
- Introduce supplementary foods in small quantities and gradually from about 4-6 months, but only after the baby has completed the feed on breast.
- Continue breast-feeding. while introducing supplementary or semi-solid foods.
- At all times, ensure sufficient food and fluid intake by the mother.

The optimal breast-feeding patterns are given in **Table 3**. These patterns, if widely practised, will decrease fertility in the postpartum months.

The special implications of the potential of breast-feeding as birth spacer among the vast economically underprivileged populations in the developing world should be kept in focus. The use of contraceptives has not yet permeated into these population groups. The women neither have the knowledge of, nor have the access to artificial contraceptive measures.

If educational measures were to be undertaken to induce desirable breast-feeding behaviour in order to derive the maximum potential for fertility regulation, it would go a long way to protecting the health of millions of women and their infants in the developing world.

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PART 2

MULTICENTRE STUDY ON BREAST-FEEDING AND FERTILITY

conducted in Egypt, Pakistan, Saudi Arabia and Sudan

Results and Interpretation

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1. Study design and research setting

1.1 Organization of the study

1.1.1 METHODOLOGY

This cross-sectional study was based on a simplified protocol and was designed to assess the proportion of mothers at risk of conceiving, deriving from their breast-feeding status. The method was based on scientifically proven techniques that provide an estimate of the duration of postpartum amenorrhoea, also termed lactational amenorrhoea, which is associated with the duration of breast-feeding. The method is described in detail in the WHO document entitled *Breast-feeding and fertility: a simplified methodology for community-based calculation of the proportion of mothers at risk of conception by breast-feeding and fertility* *, issued by WHO headquarters to assist national maternal and child health (MCH) and family planning administrators in identifying, within given social groups, at what time postpartum contraception should be promoted and counselling provided to complement the natural family planning role of breast-feeding.

The study was carried out based on a carefully designed questionnaire. The method permits rapid, but scientifically valid assessment of a few key elements of information. The questions that are asked of the respondents are simple, and the choices and design of the questions are specific and are based on accumulated scientific evidence. The analysis of the basic data is simple and straightforward, and the methodology has been designed to obtain information at the local level.

The objective of the methodology is to provide community health professionals with information that is useful for designing programmes for family planning and infant feeding, so that these two programmes complement and do not interfere with one another. The methodology makes possible decisions about the timing and content of family planning methods, based on the following four scientifically derived facts:

1) Postpartum amenorrhoea has a significant impact on child-spacing in many countries.
2) The pattern of breast-feeding affects the duration of lactational amenorrhoea: those women who breast-feed longer have a longer duration of lactational amenorrhoea.
3) Amenorrhoea in the postpartum period serves as an indicator of postpartum infertility. Return of menses is more easily identified by a woman than return of ovulation. In community surveys, the return of menses indicates the return to fertility.
4) The current-status method is a scientifically validated indicator of the duration of breast-feeding and amenorrhoea. The analysis of current-status data involves using a current-status life table and deriving a (probability) curve from it.

1.1.2 COLLABORATING CENTRES

The multicentre study on breast-feeding and fertility, sponsored by the World Health Organization (WHO) was undertaken by the following four institutions located in four countries of the Eastern Mediterranean Region of WHO:

— Nutrition Department, High Institute of Public Health, Alexandria University, Alexandria, Egypt;

*(unpublished document MCH/85.15)

— Nutrition Section, Ministry of Planning and Development, Islamabad, Pakistan.
— Nutrition Division, Health Affairs of the Western Region, Taif, Saudi Arabia;
— Ahfad University for Women, Omdurman, Sudan.

1.1.3 COORDINATION

The responsibility for planning, coordination and follow up of the study was shared between the Family Health Division, WHO, Geneva, and the Maternal and Child Health and Family Health (MCH/FHE) Unit of the Regional Office for the Eastern Mediterranean of WHO (EMRO) in Alexandria, Egypt.

Principal investigators in each country (see **Table 4**) were responsible for the organization and implementation of the studies and the preparation of individual reports based on an agreed format. The individual reports were presented and discussed at the Intercountry Workshop on Breast-feeding and Female Fertility, convened by EMRO, in collaboration with the United Nations Population Fund in Cairo, Egypt, from 25 to 29 November 1990. These reports were consolidated by the MCH/FHE Unit, EMRO, a summary of which is presented here.

1.2 Statement of hypothesis

The study considered the following two overall hypotheses:

— Lactational amenorrhoea is highly effective as a natural contraceptive mechanism, and is an important method of child spacing, when breast-feeding is prolonged and practised on demand, during day and night.
— Appropriate health care measures promote and support breast-feeding and birth control practices.

1.3 Specific questions and objectives

The principal objectives of the study were to investigate the breast-feeding and postpartum fertility profile in some countries of the Region and to arrive at answers to the following specific questions:

1.3.1 WHAT ARE THE CURRENT PRACTICES OF BREAST-FEEDING?

— How is breast-feeding initiated?
— For how long does breast-feeding continue?
— What is the breast-feeding pattern?
— What is the supplementary feeding pattern?

1.3.2 DO HEALTH CARE SERVICES PROMOTE BREAST-FEEDING AND BIRTH CONTROL PRACTICES?

— What is the extent of utilization of antenatal care services, how are the services delivered and to what extent is breast-feeding encouraged?
— What are the current birth control practices and what is the role of health care services in promoting birth control?

1.3.3 HOW DO CURRENT BREAST-FEEDING PRACTICES AFFECT FERTILITY?

— What proportion of lactating women remain amenorrhoeic at different postpartum intervals?

— What is the incidence of a new pregnancy within 24-month intervals?
— Is the relationship between lactation and postpartum infertility known to the woman?

1.4 Study variables

The study variables selected were classified into five categories:

1) Sociodemographic characteristics: age of the mother, education, marital status, occupation, age of the youngest child.
2) Fertility performance: incidence of pregnancies, return of menstruation, state of amenorrhoea.
3) Health care services: attendance for antenatal care, provision of breast-feeding information, provision of information about contraception, place of delivery, postnatal care practices.
4) Breast-feeding and infant feeding practices: initiation of breast-feeding, current status of breast-feeding and the practice of giving liquids during the first three days after birth.
5) Birth control practices: current practices of birth control, birth control methods, timing of use of birth control measures, knowledge about the relationship between birth control and breast-feeding.

1.5 Research setting

Breast-feeding and fertility patterns were studied in four different countries of the Region, namely Egypt, Pakistan, Saudi Arabia and Sudan. The designated research centres selected their study populations from a chosen area to represent urban, suburban and rural populations.

1.5.1 SAMPLING

The studies were carried out among mothers attending MCH centres for immunization of their infants. The basic criteria for the selection of mothers to be included in the study, according to a simplified methodology suggested by the MCH Working Group on Breast-feeding and Fertility, was to include those mothers who had a completed pregnancy within the previous 24 months. Some variations in sampling occurred between centres where household samples were included in areas that were not covered by MCH centres. The inclusion criteria for mothers were:

— had to be in the reproductive age-group;
— had to have had a completed pregnancy; *and*
— had to have an infant 1-24 months' of age.

TABLE 5. **Sample size in each country**

Country	No. of mothers
Egypt	1134
Pakistan	1440
Saudi Arabia	1019
Sudan	1500
Total	5093

1.5.2 SAMPLE SIZE

The size of the samples was determined by the individual centres. A total of 5093 mothers were included in the study. The number of mothers enrolled in the different countries is shown in **Table 5**.

1.5.3 RESEARCH INSTRUMENT

A simplified methodology proposed by the Maternal and Child Health Unit of WHO, Geneva, and prepared by the MCH Working Group on Breast-feeding and Fertility, was adopted. The research instrument recommended was a questionnaire included as part of the simplified methodology, and contained specific questions relating to the objectives of the study.

1.5.4 DATA PROCESSING AND ANALYSIS

Coding of the questionnaire and computer analysis was done by the individual centres. The data presented in the individual reports were consolidated and presented in the form of simple descriptive statistics and frequency tables.

1.6 Comments on the study design and research setting

The main purpose of including this section is to stimulate researchers to undertake more detailed studies in future in order to obtain further data on several related questions. Comments on the study design and the research setting have been made under the following headings.

1.6.1 COMPONENTS ASSESSED

The study considered three components, based on the three hypotheses:

— lactational amenorrhoea as a natural contraceptive method;
— role of appropriate health care measures to support and promote breast-feeding;
— role of existing health care services to introduce birth control measures after appropriate time interval after the birth of the child.

The antifertility effect of breast-feeding is at a maximum during lactational amenorrhoea and starts declining thereafter. The rationale for identifying the appropriate time after delivery for the introduction of suitable birth control practices, without adversely influencing lactation, is therefore related to this declining antifertility effect and avoiding "double coverage". It is particularly important to consider the effect of hormone-based contraceptive pills that are reported to suppress the output of breast milk.

The primary intent of the study was to evaluate the birth-spacing effect of breast-feeding. However, the use of artificial birth control devices interfered with the effect of breast-feeding and confuse data interpretation. Incorporation of methods in the study design to measure independently the birth-spacing effect of breast-feeding and of contraceptive devices would have provided better information.

1.6.2 SPECIFIC QUESTIONS AND OBJECTIVES OF THE STUDY

The specific questions and objectives related to the hypothesis have been well stated. The questions which relate to promoting and supporting breast-feeding and other birth control programmes have already been noted in Sections 1.3.1 and 1.3.2. However, two key questions that are significant and need to be addressed more explicitly are:

— What is the proportion of lactating women remaining amenorrhoeic at different times postpartum?
— What is the incidence of a new pregnancy within a 24-month interval?

1.6.3 STUDY VARIABLES

The five major study variables were related to sociodemographic characteristics, fertility performance, health care services, breast-feeding and non-milk feeding practices, and birth control practices.

Information on some additional variables would have led to a better understanding of the association between breast-feeding and fertility control. Among the sociodemographic variables, information on per capita income and place of residence (whether urban or rural) would have been useful. Some of the countries of the Region have witnessed a dramatic increase in their *per capita* gross national product, with consequent changes in lifestyle. These may have influenced sociocultural practices related to breast-feeding and birth control. Similarly, disaggregated information with respect to the place of residence would have been helpful in order to identify some of the factors that influence breast-feeding and birth control measures.

Increased parity has been described in literature to be associated with increased lactational amenorrhoea, with its consequent effect on birth interval. Parity, however, has not been included under the fertility performance variable.

Frequent suckling is a strong stimulus for the suppression of ovulation. Thus, exclusive breast-feeding on demand, both during day and night, is a more effective birth control measure as compared with partial breast-feeding. Early introduction of supplementary foods and their quantity tends to decrease the suckling and, consequently, breast-milk output, thus affecting the fertility control effect of breast-feeding.

1.6.4 RESEARCH SETTING

The present investigation was a large multicentre study that included 5093 mothers attending MCH centres. Since it was a health-facility-based cross-sectional study, the results have to be interpreted taking this setting into consideration. In addition, the study does not provide the true baseline figures, i.e. the total number of eligible mothers in the community and the proportion of eligible mothers who utilize MCH services in these areas. The disaggregated information on the location of MCH centres, whether semi-urban or rural, though mentioned, has not been specifically given. The report did not provide information on the frequency of contacts with the mothers and the place of interview, if there was more than one contact.

The criteria for the selection of mothers for inclusion in the study was stated, but the sampling procedure adopted (random or otherwise) was not specified.

1.6.5 SAMPLE SIZE

The sample size could also have been calculated statistically, using the outcome variables of pregnancy and lactational amenorrhoea.

2. Results and interpretations

The study was conducted in four countries of the Region. The data for most of the variables were provided for three centres only as data on some aspects of the study were not available from Pakistan.

2.1 Sociodemographic characteristics of study population

Some of the sociodemographic characteristics of the study population are given in **Table 6.** The mean age at the time of interview was 29 years and there was almost no intercountry difference in the mean ages of the mothers, nor in their age distributions.

Over 95% of the mothers involved in the study were not working outside the home. The highest proportion of working mothers was in Sudan (12%).

The overall literacy rate of the study population was 37%. It ranged from 7% in Pakistan to 71% in Sudan; 19% mothers in Saudi Arabia and 45% in Egypt were literate.

The mothers involved in the study were classified into four age groups, according to the age of their youngest child, namely, less than 6 months, 6 to less than 12 months, 12 to less than 18 months, and 18 to less than 24 months. Over 74% of children were under 12 months of age (**Table 7**). None of the children were older than 18 months in the Saudi Arabian study population. The mean age of children ranged between 7 and 11.6 months with an overall mean of 9 months.

TABLE 6. **Distribution and percentage of mothers, according to some sociodemographic characteristics**

Characteristics	Egypt		Pakistan		Saudi Arabia		Sudan		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Age of mothers (in years)										
< 20	42	3.7	143	9.9	31	3.0	58	3.9	274	5.4
20 -29	676	59.7	820	56.9	542	53.2	827	55.7	2865	56.4
30 -39	383	33.7	427	29.7	394	38.7	559	37.6	1763	34.7
> 40	33	2.9	50	3.5	52	5.1	41	2.8	176	3.5
Total	1134	100	1440	100	1019	100	1485	100	5078	100
Mean age	28.6	± 6.0	27.7	± 6.8	29.6	± 6.4	28.9	± 6.1	28.6	± 6.4
Working status										
Working	45	4.0	0	0	39	3.8	174	11.6	258	5.1
Not working	1089	96.6	1440	100	980	96.2	1326	88.4	4835	94.9
Total	1134	100	1440	100	1019	100	1500	100	5093	100
Literacy										
Illiterate	620	54.7	1339	93.0	818	80.8	437	29.1	3214	63.2
Literate	514	45.3	101	7.0	195	19.2	1063	70.9	1873	36.8
Total	1134	100	1440	100	1013	100	1500	100	5087	100
Marital status										
Married	1123	99.0	1413	98.1	987	96.9	1480	98.7	5003	98.2
Widowed	5	50.4	27	1.9	22	2.2	12	0.8	66	1.3
Divorced	6	0.6	-	-	10	0.9	8	0.5	24	0.5
Total	1134	100	1440	100	1019	100	1500	100	5093	100

TABLE 7. **Distribution and percentage of mothers, according to the age of the youngest child**

Age, in months	Egypt		Saudi Arabia		Sudan		Total	
	No.	%	No.	%	No.	%	No.	%
0 - < 6	266	23.4	442	43.4	654	43.6	1362	37.3
6 - < 12	412	36.4	491	48.3	460	30.7	1363	37.3
12 - < 18	156	13.8	85	8.3	279	18.6	520	14.2
18 - < 24	300	26.4	-	-	107	7.1	407	11.2
Total	1134	100	1018	100	1500	100	3652	100
Mean age	11.6 ± 6.7		7.0 ± 3.8		8.4 ± 5.7		9.0 ± 5.9	

2.2 Current practices of breast-feeding

The results relating to current practices of breast-feeding were presented under the following subheadings:

— Rooming-in practice and initiation of breast-feeding;
— Introduction of non-milk liquids during the first three days after birth;
— Breast-feeding patterns;
— Duration of breast-feeding.

Information about rooming-in practice was available from a total of 4776 (94%), out of a total study population of 5093 mothers (Egypt 1134; Pakistan 1146; Saudi Arabia 1011 and Sudan 1485). Rooming-in is a culture-dependent practice and close proximity of the child to the mother is likely to promote early initiation of breast-feeding.

Most of the newborns were roomed-in with their mothers in the same bed in Egypt (94%), Pakistan (93%), Sudan (88%), while for Saudi Arabia the figure was the lowest (46%). The newborns were kept in separate rooms in less than 2% of cases, except in Saudi Arabia where 22% of the newborns were kept away from their mothers. The results from Saudi Arabia presumably reflect the effect of rapidly changing economic status and lifestyles on breast-feeding practices.

The information on initiation of breast-feeding after delivery is given in **Table 8**. It is interesting

TABLE 8. **Distribution and percentage of mothers, according to time of initiation of breast-feeding**

Initiation of breast-feeding	Egypt		Saudi Arabia		Sudan		Total	
	No.	%	No.	%	No.	%	No.	%
1 hour afterdelivery	744	69.4	114	11.5	797	54.6	5	47.0
1 - 6 hours	141	13.1	521	52.6	390	26.7	10	29.9
7 - 12 hours	63	5.9	194	19.6	187	12.8	444	2.6
> 12 hours	124	11.6	161	16.3	86	5.9	371	10.5
Total	1072	100	990	100	1460	100	3522	100

to note that 45% of mothers suckled their child within one hour after delivery and, by 6 hours, 75% of the children were being breast-fed.

Early initiation is essential for establishing long-term successful breast-feeding, in addition to providing the infant with the much-required nutrients and protective factors present in the colostrum. Although the number of mothers from Saudi Arabia initiating breast-feeding within one hour after delivery was significantly less (11.5%), as compared with those from Egypt (69.4%) and Sudan (54.6%), the differences in the different countries were minimal by the sixth hour.

Rooming-in of the newborn with the mother on the same bed and suckling the infant within an hour of delivery are healthy practices widely prevalent in the Region. There is a need to reinforce these practices during antenatal visits through the existing health care services. It is equally important to take urgent steps in countries that are witnessing rapid economic growth so as toreverse the trend of keeping infants away from mothers, thereby delaying the initiation of breast-feeding.

2.3 Introduction of non-milk liquids during first three days after birth

Feeding the infant with liquids during the first three days after birth was a common practice among the study population: Sudan 92%; Egypt 79% and Saudi Arabia 78%. The types of liquids given included sugar and water, sugar, caraway or anise and water, powdered milk and other liquids. The non-breast milk liquids that are given to the babies are generally contaminated and can lead to enteric infection. Recent studies have shown that even in hot and dry environments such liquids are unwarranted and, in fact, are associated with reduced intake of breast milk.

It is a matter of concern that 29% of mothers in Saudi Arabia started giving powdered milk within the first three days after birth. This practice of early introduction of formula milk is not only hazardous, adding to the increased frequency of enteric infections, it is also likely to reduce the total duration of breast-feeding (see **Table 10**).

2.4 Breast-feeding patterns

At the time of interview, 79% of the mothers were breast-feeding, the highest percentage being in Sudan (91%) and the lowest in Egypt (67.7%) (**Table 9**). Demand feeding (72.9%) was the most common practice adopted for breast-feeding in all the countries. However, there were marked intercountry variations: Saudi Arabia (93%); Pakistan (85%); Sudan (68%) and Egypt (57%). Demand breast-feeding is preferable to schedule feeding, because frequent suckling during both day and night ensures adequate breast milk output for a longer duration. This practice alsosuppresses ovulation more effectively.

Information relevant to the frequency and duration of breast-feeding, the number of feeds during the day and the night, and the age at which supplementary feeds were introduced are among the important factors that determine the length of the postpartum/lactational amenorrhoea. These were overlooked in some of the individual studies, and this made it difficult to correlate breast-feeding determinants of lactational amenorrhoea and fertility among the groups.

When the breast-feeding mothers in various groups were distributed according to six-monthly postpartum intervals, the proportion of breast-feeding mothers at each interval in relation to the number of live births progressively decreased with increasing postpartum interval, as expected.

TABLE 9. **Distribution of mothers, according to breast-feeding practices**

Breast-feeding practices	Egypt		Pakistan		Saudi Arabia		Sudan		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Still breast-feeding	768	67.7	1050	72.9	828	81.3	1354	91.2	4000	78.8
Not breast-feeding	366	32.3	390	27.1	191	18.7	131	8.8	1078	21.2
Total	1134	100	1440	100	1019	100	1485	100	5078	100
Breast-feeding										
on demand	436	56.8	592	84.9	502	92.8	919	68.0	2449	72.9
on schedule	332	43.2	105	15.1	39	7.2	433	32.0	909	27.1
Total	768	100	697	100	541	100	1352	100	3358	100

2.5 Duration of breast-feeding

The mean duration of breast-feeding ranged between 4.2 months (Saudi Arabia) to 8.3 months (Egypt) (**Table 10**). Over 65% of the mothers continued to breast-feed their infants beyond six months.

Many in a sub-sample of mothers from Saudi Arabia (82%) had stopped breast-feeding by six months; however, this information had been provided only for about 16% of the total sample of 1019 Saudi Arabian mothers. In the absence of information regarding the selection of these mothers, it is difficult to comment whether the sub-sample is truly representative of the study population. Possible factors responsible for early cessation of breast-feeding in Saudi Arabia could be the practice of keeping the newborn in a separate room during the immediate neonatal period, suckling the infant more than one hour after delivery, and the introduction of powdered (formula) milk during the first three days of life.

Data on breast-feeding practices from the study population indicated that the majority of the mothers adopted a behaviour that promotes as well as supports breast-feeding well beyond six months after delivery. There was, however, a uniform practice of offering non-milk liquids to newborns during the first three days of life, presumably under the mistaken belief of inadequate breast milk output during this period. There is a need to carry out active health education to stop this unnecessary and harmful practice. In Saudi Arabia, alarming trends were observed among the mothers, who seem to be abandoning some of the useful practices prevalent in the neighbouring countries with a comparable sociocultural environment.

TABLE 10. **Distribution of mothers, according to the length of period before stopping breast-feeding**

Period before stopping breast-feeding	Egypt		Saudi Arabia		Sudan		Total	
	No.	%	No.	%	No.	%	No.	%
< 4 months	-	-	86	52.1	10	6.8	96	16.1
4 - 6 months	16	5.6	49	29.7	45	30.8	110	18.4
> 7 months	270	94.4	30	18.2	91	62.4	391	65.5
Total	286	100	165	100	146	100	597	100
Mean period (months)	8.3 ± 0.7		4.2 ± 2.5		7.1 ± 1.9		6.9 ± 2.4	

3. Role of health care services in promotion of and support to breast-feeding

As mentioned earlier, the present investigation was a cross-sectional study based on health care facilities. The subjects were chosen from among that group of mothers who were utilizing the immunization services provided.

3.1 Attendance at antenatal care facilities

A total of 79% mothers had attended antenatal clinics. The proportion varied between 68% in Egypt to 91% in Sudan. However, there is no information on the number of antenatal visits. It would have been useful if the reasons were ascertained for mothers not attending the antenatal clinics.

3.2 Delivery of antenatal care

Antenatal care was provided by physicians to 89% of mothers in Saudi Arabia and 65% in Egypt. The proportion of mothers receiving antenatal care from a physician in Pakistan (14%) and Sudan (4%) was comparable to the remaining developing countries in the Region. In most of these countries, antenatal care is mainly provided by paramedical personnel or traditional birth attendants, as is the case in Pakistan (86%) and Sudan (96%).

Midwives played a relatively minor role in antenatal care; the percentage of mothers who received such care from midwives was 0.5% in Saudi Arabia, 10% Egypt and 19% in Sudan.

In Pakistan, over 82% mothers received antenatal care by individuals other than physicians and nurses.

3.3 Place of delivery

On average, 54% of deliveries took place at home. The highest percentage of domiciliary deliveries was reported from Pakistan (88%), in contrast to Saudi Arabia, where only 31% deliveries took place at home. Very few deliveries took place at MCH centres (5%) and private clinics (2%). The remaining 39% of deliveries took place in hospitals.

In societies where a significant proportion of deliveries is institutional (government and private), the opportunity should be seized to reinforce messages relating to breast-feeding through these institutions. There is a general impression that hospitals do not play any role in the promotion of breast-feeding; indeed, there is evidence to indicate that artificial feeding with breast-milk substitutes is initiated in many hospitals.

A sizeable proportion of deliveries is conducted by traditional birth attendants who can potentially play an important role in reinforcing positive and useful breast-feeding behaviour, especially in rural and semi-urban areas.

3.4 Provision of breast-feeding information during pregnancy

Most of the mothers (87%) had claimed to have received information related to breast-feeding during their antenatal visits, the highest proportion being in Pakistan (98%), followed by Saudi Arabia (97%), Egypt (92%) and Sudan (68%). However, the content of the messages given during antenatal care was not collected in the present study. Mothers in Saudi Arabia breast-fed their infants less often and for shorter periods (4.2 months), despite receiving messages related to breast-feeding by a high proportion of them (97%). This underscores the relevance of framing

appropriate, precise and clear messages, crucial if knowledge is to be translated into practice. It is interesting to note that 89% of mothers in Saudi Arabia received antenatal care from physicians.

Although antenatal services in Pakistan were primarily provided by midwives and other health workers, almost all of them had communicated breast-feeding messages. It is, therefore, important to recognize that all health workers can (and must) participate in the dissemination of health messages, and active steps should be taken to make effective use of all MCH workers in information dissemination.

3.5 Provision of breast-feeding information during postnatal care

Breast-feeding messages, particularly those relating to exclusive breast-feeding, should be communicated at each contact with the mother. However, as the study shows, in actual settings, only 34% of the mothers received information about breast-feeding during these postnatal visits. This is in sharp contrast to the antenatal period when over 90% of the mothers received breast-feeding messages. Thus it is evident that there is a need to utilize optimally the contacts with mothers for the promotion of breast-feeding, particularly exclusive breast-feeding, during the first three months following the birth. During this period, the mother usually makes three visits to the health facility for immunization purposes. However, it is not known how pregnant women and mothers would respond to breast-feeding messages that incorporate its fertility control benefits. It is thus necessary to undertake studies using qualitative research methodology that would help us to understand changes in breast-feeding behaviour when the mothers fully recognize the antifertility effect of breast-feeding.

The study shows that mere attendance at an antenatal clinic, a visit to a health facility or care by a particular level of health worker does not ensure higher prevalence of breast-feeding practice. Therefore, there is a need to design and formulate messages that are delivered at the proper time for maximum impact on actual breast-feeding behaviour.

3.6 Taking the baby to the health centre

The practice of taking the baby to the health centre varied widely from country to country. It was encouraging to note that, among the study populations more than 98% of the infants were taken to a health centre within the first three months of life.

In the first week after delivery, only 20% of the mothers had taken their babies to the health centre; the percentage of mothers varied between 4% in Egypt to 61% in Pakistan. However, information about Pakistani mothers was available only from one-third of the study population. The 98% of the infants taken to a health centre within the first three months were presumably taken there for immunization. This is an opportunity that should be used by the health care system to promote and stress the importance of exclusive breast-feeding.

4. Role of health care services in the promotion of birth control practices

4.1 Information about contraception during antenatal care

Out of a total 3369 mothers who attended antenatal clinics, 42% of them received information about contraception (Egypt 76%, Saudi Arabia 31% and Sudan 29%). An expectant mother is

likely to be receptive to any advice regarding the well-being of her forthcoming child. Among other interventions, child spacing is an effective way of ensuring not only better health of the newborn child, but also that of the mother. Exclusive breast-feeding during the first four to six months and introduction of birth control practices at the appropriate postnatal period can have a synergistic effect on child spacing. Visits to antenatal clinics should therefore be used more effectively for family welfare messages in addition to other activities.

4.2 Practice of birth control measures

Of the total 5093 mothers, at the time of interview, 8% were pregnant, 29% were using some form of birth control measure, while the remaining 63% were not using any contraceptives. The use of contraceptives varied widely between different countries: more than half of the mothers from Egypt (57%) were using birth control methods, as compared to less than 10% in Pakistan. Local as well as sociocultural factors may be responsible for such wide variations.

TABLE 11. **Distribution and percentages of mothers, according to the start of use of contraception after the birth of the youngest child**

Time elapsed since birth (in months)	Egypt		Pakistan		Saudi Arabia		Sudan		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
< 3	422	65.1	15	12.1	61	30.2	157	37.7	655	47.1
3 - 5	142	21.9	9	7.3	16	7.9	156	37.5	323	23.2
6 - 8	50	7.7	50	40.3	98	48.5	73	17.5	271	19.5
> 9	34	5.3	50	40.3	27	13.4	30	7.3	141	10.2
Total	648	100	124	100	202	100	416	100	1390	100
Mean time (months)	3.1 ± 2.5		7.8 ± 2.9		5.9 ± 3.2		4.3 ± 2.7		4.3 ± 3.1	

4.3 Start of use of contraceptives after the birth of last child

Over 47% of the mothers who decided to use contraceptives did so within the first three months after delivery (**Table 11**). The highest percentage was observed in Egypt (65%) and the lowest in Pakistan (12%). It would have been useful if the time of start of contraceptive use were correlated with the onset of menses and cessation of breast-feeding. According to available data, 63% of the mothers started menstruation when their youngest child was less than six months old. Among the mothers who were using contraceptives, 70% had started using them within six months of the birth of the child. The data do not indicate whether the information provided pertains to the same group of mothers. In the absence of information about the characteristics of contraceptive users, it may be reasonable to assume that this group of mothers had started menstruating.

It is not clear whether contraceptive users were motivated to adopt birth control measures through their visits to health facilities or in some other way. Information on the sociodemographic characteristics of these mothers would have helped to clarify the behavioural factors related to the practice of birth control measures.

The use of contraceptives is greatly influenced by the existence of active birth control programmes in the country. In communities that have no access to birth control measures or do not adopt artificial birth control measures for cultural or religious reasons, the promotion of proper breast-feeding behaviour is of great relevance for effective child-spacing programmes.

4.4 Types of contraceptives

Of the contraceptives in use, pills (45%) and intrauterine devices (IUDs) (34%) were the most popular. IUDs were more popular in Egypt (61%) and pills in Sudan (61%). IUDs were not used in Pakistan. Condoms were not popular (5%) as a birth control method, particularly in Egypt and Saudi Arabia where no one in the sample used them.

Hormonal preparations used as a contraceptive method may suppress lactation by interfering with prolactin secretion. There is a need to quantify the effect of pills on breast milk output, adverse health effects on the suckling infant and the appropriate timing of introduction of pills after the delivery.

5. Current breast-feeding practices and fertility control

5.1 Fertility performance

Out of the total study population of 5093 mothers whose youngest child was less than two years old at the time of interview, 62% were menstruating, 31% had lactational amenorrhoea and the remaining 7% were pregnant. The highest proportion of menstruating mothers was observed in Saudi Arabia (85%), followed by Egypt (73%), Pakistan (51%) and Sudan (47%). The number of pregnant mothers varied between 5% (Saudi Arabia) to 10% (Pakistan).

The end of the period of lactational amenorrhoea and recurrence of menstruation were related to the age of the last born, i.e. youngest child. Over 63% of the menstruating mothers had recurrence of menses when the youngest child was less than six months, and of these 92% had recurrence of menses when the youngest child was less than one year old (**Table 12**). The mean age of the youngest child at the time of onset of menstruation varied between 5.1 months (Egypt) and 7.5 months (Saudi Arabia).

TABLE 12. **Distribution and percentage of mothers, according to the age of the youngest child on return of menstruation**

Age of youngest child, in months	Egypt		Saudi Arabia		Sudan		Total	
	No.	%	No.	%	No.	%	No.	%
< 6	642	77.7	151	33.8	451	64.6	1244	63.1
6 - 11	107	12.9	258	57.7	191	27.4	556	28.2
12 - 17	56	6.7	38	8.5	46	6.6	140	7.1
> 18	22	2.7	-	-	10	1.4	32	1.6
Total	827	100	447	100	698	100	1972	100
Mean age	5.1 ± 4.3		7.5 ± 3.5		6.6 ± 4.1		5.8 ± 4.2	

Out of a total of 1539 mothers amenorrhoeic at the time of interview, 49% had a youngest child of less than 6 months of age; the age of the youngest child was less than one year for 86% of the amenorrhoeic mothers. Mothers who stated that they became pregnant following the birth of their youngest child were grouped into four six-monthly intervals of postpartum period. The proportion of those who had a new pregnancy at each interval was observed as progressively increasing from 1% in the first six-month postpartum interval to 11% in the 18-24 month postpartum interval.

In addition to other factors, the lower proportion of pregnancies during the first six months in Saudi Arabia and Sudan may be due to practice of abstinence following delivery, which is not known in Egypt. Thus, it appears that, in the first six months after delivery, the mothers had low fertility, despite the fact that a significant proportion (63%) of them had started menstruating during this period. One of the possible factors responsible for this low fertility during the first six months of postpartum period may be the early adoption of birth control practices.

TABLE 13. Distribution and percentage of mothers, according to their knowledge about the relationship between breast-feeding and prevention of pregnancy

Knowledge	Egypt		Pakistan		Saudi Arabia		Sudan		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Knows	860	75.8	851	59.1	823	80.8	1220	81.3	3754	73.7
Does not know	274	24.2	589	40.9	196	19.2	280	18.7	1339	26.3
Total	1134	100	1440	100	1019	100	1500	100	5093	100
Believes that the knowledge is true?										
Yes	602	53.1	785	54.5	658	64.6	1293	86.2	3338	65.5
No, or does not know	532	46.9	655	45.5	361	35.4	207	13.8	1755	34.5
Total	1134	100	1440	100	1019	100	1500	100	5093	100
Why she did not believe:										
Became pregnant	330	52.2	-	-	195	54.0	79	38.2	604	50.3
Was told it was not safe	71	11.2	-	-	110	30.5	113	54.6	294	24.5
Does not know	231	36.6	-	-	56	15.5	15	7.2	302	25.2
Total	632	100	-	-	361	100	207	100	1200	100

5.2 Knowledge about relationship between breast-feeding and prevention of pregnancy

An estimated 74% of the mothers had stated that they recognized that breast-feeding was supposed to prevent pregnancy (**Table 13**). The highest percentage was among Sudanese mothers (81.3%) and the lowest in Pakistan (59%); however, only 65.5% of these actually believed this knowledge to be true. When the remaining 34.5% were asked why they did not believe in breast-

feeding as a birth control measure, more than 50% of them stated that they became pregnant while breast-feeding. It is well known that breast-feeding behaviour is the most important factor in preventing pregnancy in the early postpartum period. In order to prevent or delay pregnancy, breast-feeding should be exclusive, on demand day and night, and possibly this was not practised by most mothers who participated in the study.

In this situation, the independent variable will be lactation and the primary outcome (dependent) variable will be pregnancy. By using an appropriate regression analysis model, relative risk for different related variables, such as the duration of breast-feeding, breast-feeding behaviour, duration of amenorrhoea, onset of menstruation, contraceptive use, etc. can be generated.

6. Summary

The multicentre study on breast-feeding and fertility was undertaken by four institutions located in four countries of the Eastern Mediterranean Region of WHO, namely, Egypt, Pakistan, Saudi Arabia, and Sudan. Though a similar study was conducted in a fifth centre at Tunis, it could not be completed. The data from Pakistan were also very limited.

The study considered two overall hypotheses, namely that lactational amenorrhoea is highly effective as a natural contraceptive mechanism and is an important method of child spacing when breast-feeding is prolonged, practised on demand, during day and night and that appropriate health care measures promote and support breast-feeding and birth control practices.

The principal objectives of the study were to investigate the breast-feeding and postpartum fertility profile, to identify the major characteristics of current breast-feeding practices, the existing role of health care services in promoting breast-feeding and birth control practices, and to investigate the effect of current breast-feeding practices on fertility.

The study was carried out among mothers attending MCH centres to have their infants immunized. The basic criteria for the selection of mothers to be included in the study were that they should be in the reproductive age-group, and had a completed pregnancy during the previous 24 months. A total of 5093 mothers were included in the study (Egypt 1134; Pakistan 1440; Saudi Arabia 1019; Sudan 1500). It was a cross-sectional health facility-based study, using a simplified methodology proposed by the Maternal and Child Health Unit of WHO Geneva, and developed by the MCH Working Group on Breast-feeding and Fertility of WHO.

6.1 Current practices of breast-feeding

Most of the newborns were roomed-in with their mothers in the same bed in Sudan (88%), Pakistan (93%) and Egypt (94%). However, 46% Saudi Arabian mothers were not in the same room as their children. Almost half the mothers of the Region (45%) suckled their child within one hour after delivery and, by 6 hours, 75% of the infants were being breast-fed. The number of mothers breast-feeding at one hour in Saudi Arabia were lower (11.5%) than in other countries, but, by the sixth hour, the intercountry differences were minimal.

Rooming-in of the newborn with the mother in the same bed and suckling the infant within an hour of delivery are desirable practices widely prevalent in the four countries. There is a need to reiterate these practices to mothers during their antenatal visits to the health facility. However,

equally important are the steps for reversing the trend of keeping infants away from mothers and delayed initiation of breast-feeding, as was observed in Saudi Arabia.

Giving liquids other than milk during the first three days after birth was a common practice among the study population: Sudan 92%; Egypt 79% and Saudi Arabia 78%. These liquid preparations are generally contaminated and carry a high risk of enteric infections. Over 29% mothers in Saudi Arabia started giving reconstituted formula milk during this early neonatal period and this was possibly one of the reasons for reduced duration of breast-feeding.

Demand breast-feeding (72.9%) was common in all the countries. Demand breast-feeding ensures adequate breast milk output for a longer time and suppresses ovulation more effectively. The mean duration of breast-feeding ranged between 4.2 months (Saudi Arabia) to 8.3 months (Egypt). Over 65% mothers continued to breast-feed their infants beyond six months, but in Saudi Arabia most mothers (82.%) had stopped breast-feeding by this time.

In conclusion, data on breast-feeding practices from the study populations indicate that the majority of the mothers adopted behaviours that promote, as well as support breast-feeding well beyond six months after delivery. There was, however, a uniform practice of offering non-milk liquids to newborns during the first three days of life, presumably under the mistaken belief that there was an inadequate breast milk output during this period. There is a need to carry out active health education to stop this unnecessary and harmful practice. In Saudi Arabia, alarming trends were observed among mothers, who seem to be abandoning some of the useful practices prevalent in the neighbouring countries with a comparable sociocultural milieu. In fact, these trends should be actively stopped in most of the developing societies that are moving fast towards industrialization, with its consequent economic prosperity and sociocultural transformations.

6.2 Role of existing health care practices in promoting and supporting breast-feeding

Since the mothers were registered for the study at MCH centres, a high proportion (79%) of these had attended antenatal clinics. Antenatal care was provided by physicians to 89% of mothers in Saudi Arabia and 65% in Egypt, but mainly by paramedical personnel, traditional birth attendants or others, in Pakistan (86%) and Sudan (96%). It is, thus, evident that country and region specific guidelines should be formulated for information, education and communication (IEC) strategies on breast-feeding for use by the different levels of health worker.

Of all the deliveries, 54% took place at home; the highest percentage was reported from Pakistan (88%) and lowest in Saudi Arabia (31%). A large proportion of deliveries were attended to by traditional birth attendants. They can potentially play an important role in reinforcing positive and useful breast-feeding behaviour, especially in rural and semi-urban areas. This is a field which needs immediate attention.

Postnatal education should include effective messages on breast-feeding. Most mothers (87%) claimed to have received information related to breast-feeding during their antenatal visits. Mothers in Saudi Arabia breast-fed their infants less often and for shorter duration (4.2 months), despite receiving messages related to breast-feeding by a high proportion (97%) of them during the antenatal period. This underscored the relevance of framing appropriate, precise and clear messages that are crucial to translate knowledge into practice.

It was encouraging to note that 98% mothers had visited the health centre with their infants at some time within the first three months of life. However, only 34% of the mothers had received

information about breast-feeding during these postnatal visits. This is in sharp contrast to the antenatal period when over 90% mothers received messages concerning breast-feeding.

The study showed that mere attendance at antenatal clinics, visits to a health facility or care by a particular level of health worker did not ensure a higher prevalence of breast-feeding practice. In addition, there is a need to undertake studies using qualitative research methodology to evaluate the responses of pregnant women and mothers to breast-feeding messages that incorporate its fertility control benefits.

6.3 Role of health care services in the promotion of birth control practices

Out of the 3369 mothers who attended antenatal clinics, 42% of them received information about contraception (Sudan 29%; Saudi Arabia 31%; Egypt 76%). The use of contraceptive measures after the delivery varied between 10% (Pakistan) and 57% (Egypt). Over 47% of mothers who decided to use contraceptives did so within the first three months after the delivery. However, the time of start of contraceptive use was not correlated with lactational amenorrhoea and cessation of breast-feeding. Among the mothers who were using contraceptives, 70% had started using it within six months of the birth of the child. The popular contraceptives used were pills (45%) and IUDs (34%); condoms were rarely used (5%).

The practice of contraceptive use is greatly influenced by the existence of an active birth control programme in the country. In communities that have no access to birth control measures, or do not adopt artificial birth control measures for cultural or religious reasons, the promotion of breast-feeding is of great relevance for effective child-spacing programmes.

6.4 Current breast-feeding practices and fertility control

Out of the total study population of 5093 mothers, 62% were menstruating, 31% had lactational amenorrhoea and a remaining 7% became pregnant during the study period. Over 63% of the menstruating mothers had return of menses when the youngest child was less than six months old, and 92% of these mothers had started menstruating when the youngest child was less than one year old. The proportion of those who had a new pregnancy increased progressively from 1% in the first six-month postpartum interval to 11% in the 18 to 24 month postpartum interval. In addition to other factors, the lower proportion of pregnancies during the first six months in Saudi Arabia and Sudan may be due to the practice of abstinence following delivery, a practice which is not prevalent in the other two countries.

Although an estimated 74% of the mothers had stated that breast-feeding can prevent pregnancy, only 65% of these mothers actually believed this to be true. The reason for not believing was that they had become pregnant while lactating. It is well known that breast-feeding behaviour is an important determinant in preventing pregnancy in the early postpartum period. In order to prevent or delay pregnancy, breast-feeding should be exclusive, on demand day and night, and this was possibly not how it was practised by mothers who participated in the study.

PART 3

CONCLUSIONS

Breast-feeding and fertility

1. The physiological, biochemical, immunological, economic and emotional advantages of breast-feeding for the promotion and protection of infant health have been documented in numerous publications and are becoming better understood. For example, breast-feeding is undoubtedly the best means to protect the immature gut of the newborn infant for which breast milk is precisely adapted. The gut matures over a period of about four to five months. during which breast milk is logically the ideal food. The oft-repeated message of exclusive breast-feeding for 4 to 5 months is, therefore, based on very firm physiological evidence.
2. However, the relationship between breast-feeding and birth spacing, though mentioned even in ancient times, has not until recently attracted scientific scrutiny. It is rarely mentioned as scientific advice to mothers as an option for fertility regulation. In fact, scientific conclaves did not include this particular advantage of breast-feeding in technical discussions until recently. Possibly the first authoritative statement recommending breast-feeding as a means of contraception was the Bellagio Consensus Statement of 1988.
3. Numerous studies the world over have fully confirmed that exclusive breast-feeding directly contributes to increasing the birth interval by tending to reduce the resumption of fertility in the mother, the precise mechanisms for which have all been clearly defined. Indeed, it has been suggested that promotion of breast-feeding for birth spacing is essential since modern contraceptives are neither universally available, for logistic reasons, nor widely used, perhaps for religious or cultural reasons. Breast-feeding in such situations is a powerful means for reducing the risk of pregnancy.
4. A common criticism is that breast-feeding is not a reliable contraceptive on an individual basis during the first four to five months postpartum. What is not conveyed to women who conceive during lactation is the fact that almost 98% protection is given by exclusive breast-feeding if certain conditions are met, for example demand feeding day and night and avoidance of all feed supplements. This protection for 4 to 5 months postpartum remains in force if the mother remains amenorrhoeic during this period. Most cases of lactating women becoming pregnant are because of non-fulfilment of these conditions. Recent studies have fully confirmed the mechanisms through which these conditions reduce her chances of becoming pregnant.
5. The frequency of suckling is possibly the most important factor not only for increasing milk secretion, but also in reducing the chances of fertility. An inhibitory peptide is secreted by the mammary alveoli to stop further milk secretion if the alveoli are not emptied regularly. It is very appropriately stated that the breast is a "supply meets demand" organ. A WHO collaborative study from 1976 to 1978 indicated a consistent and close relationship between the duration of breast-feeding and the duration of the postpartum amenorrhoea. About 85% of the total variability in return to fertility could be attributed to reported differences in the duration of breast-feeding. Thus the details of breast-feeding that are important not only include duration, but also the types of feeding, frequency of feeding, interfeeding interval, and similarly related factors.
6. It is very often asked why, in spite of all this information, breast-feeding has not been promoted for its contraceptive effect in projects aimed at limiting fertility. Berg and Brems, in an excellent review of the subject in the World Bank's Technical Paper No. 102 entitled, *A Case for Promoting Breast-feeding in Projects to Limit Fertility,* have very carefully analysed this question.

7. There have also been several recent analyses to explore the overall influence of breast-feeding practices on population growth via its contraceptive effect, and the extent to which breast-feeding can reduce contraceptive needs. It has been claimed that lactational amenorrhoea is the single most important variable among the determinants of natural fertility. The analysis by the World Bank pointed out the significant effect of breast-feeding in reducing the number of births to a large majority of couples in developing countries who do not use modern contraceptives. A recent projection by Family Health International indicates that a 25% reduction in the duration of breast-feeding in five African countries would increase total fertility rates by 12%, and that halving the duration could mean a 26% increase; corresponding figures for 12 Asian countries are 11% and 23% respectively.
8. The important role of breast-feeding in child survival has been established beyond any doubt and, in consequence, breast-feeding is a potent measure for reducing childhood mortality. The effect of childhood mortality on birth spacing can act in several ways. The death of a breast-fed infant leads biologically to resumption of fertility and an urge to replace the child as soon as possible, perhaps before the mother has recovered from the previous pregnancy. This decision can be based on the family's desire to achieve a certain family size. In general, the promotion of infant and child nutrition and survival can gradually establish better motivation for having longer birth intervals and. hence. acceptance of family planning.
9. Breast-feeding, under the stipulated conditions, is ideally designed to achieve this objective. It is an approach that should be acceptable to all women, irrespective of religion, culture and social status. The fertility-inhibiting effect of exclusive breast-feeding, followed by other family planning methods, will enable the women to plan the next pregnancy at a more appropriate time and with reasonable spacing. Breast-feeding should therefore be the the key element in the child-spacing and survival strategy. Even if contraceptive supply and demand are not constraints, as in reality they often are, significant declines in breast-feeding may place greater pressure on family planning services than they can presently cope with. In this regard, breast-feeding can help to use the relatively scarce family planning resources more efficiently.
10. In order to achieve the benefit of breast-feeding as a natural contraceptive and as a choice for family planning, it is important that workers in such programmes should first ascertain all details concerning the breast-feeding practices in the community, so that appropriate advice could be conveyed to mothers in order to maximize the fertility-inhibiting effect. As the fertility-regulating role of lactation decreases over time, or when greater security is required, breast-feeding can be combined with other contraceptive methods that do not interfere with lactation.
11. Offer of routine advice, without knowing the existing breast-feeding practices, is likely to have little impact. In fact, this might be one reason why women complain that they have become pregnant while breast-feeding. In actual practice, family planning or birth-spacing advice and services are essential components of material and child health (MCH) programmes, within the framework of the national health care system. Similarly, most nutrition programmes are delivered within the framework of MCH programmes, and they too should combine promotion of breast-feeding with family planning messages. There is, thus, a strong case for integrating all these components for the promotion of maternal and child health.
12. In order to promote an integrated approach, it is important to train both health and family planning workers so that they can educate and encourage mothers to take full advantage of the breast-feeding potential. Hence, training and retaining of medical and health professionals is

of great importance. Some excellent experience has been gained in Indonesia, where the National Family Planning Coordinating Board has launched a programme to train health educators and family planning field workers to educate women about the nutritional and contraceptive benefits of breast-feeding. Studies in the Philippines have shown that, through appropriate education programmes, women can be encouraged to increase the duration and intensity of their breast-feeding behaviour.

13. There is obviously an urgent need for understanding the value of breast-feeding as being unique for the survival and development of the newborn infant and to focus attention on its additional role in fertility regulation and birth spacing. Of importance here are also the policy-makers, programme managers and health authorities who must also learn to promote breast-feeding as a natural contraceptive, especially for the millions of women who have no other alternative.
14. The paragraphs above serve as a basis for preparing and implementing breast-feeding and fertility-control programmes, and can be used for briefing policy- and decision-makers in the health and other sectors who are concerned with mother and child health, women in society, and social welfare.
15. WHO is ready to assist Member States in preparing such programmes, which must be attuned to the cultural and religious values of the respective communities.

BREAST-FEEDING AND FERTILITY

The relationship between breast-feeding and its contraceptive qualities is not fully known and is often misunderstood. This publication explains the physiological role of breast-feeding in contraception, evaluates its effectiveness if certain guidelines are followed, and provides reasons for its failure in many cases.

The work also describes the results of a multicentric research study on breast-feeding, lactation amenorrhoea and fertility.

This publication will be of interest to maternal and child health personnel and community health care workers who provide family planning and birth

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